University of Alberta

Loneliness, Depression and Nutritional Status Among Low Income Women

By

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Loneliness, Depression, and Nutritional Status Among Low Income Women submitted by Alfred H. Graf in partial fulfillment of the requirements for the degree of Master of Nursing.

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DEDICATION

I dedicate this thesis to those who have been patient enough to allow this research to happen; to governments and institutions that provided the funding necessary to pursue my goals; to individuals who endeavored without bias to show me the way of research and those who propelled me forward because of their belief in me. Thank you/Merci Beaucoup!

ABSTRACT

Senior women living in a low-income situation are at risk for loneliness, depression and poor nutritional intake. The ALIVE program, including a strength-training program, wellness education, one-on-one informal counseling and progress report bulletins, was presented to a group of low-income seniors. For this study, the ALIVE program was used to determine its effect on the variables loneliness, depression and nutritional risk. Statistical analysis suggests that the intervention may have contributed significantly to the reduction of nutritional risk for the treatment group. Correlation analysis revealed a positive and significant relationship between loneliness and depression, loneliness and nutritional risk and depression and nutritional risk. Validation of the NSI DETERMINE checklist could not be established based on percent change body mass index scores. A reliability coefficient of .72 was established using the KR-20 formula. This study supports interventions that improve the functional well-being and quality of life of seniors at risk for poor outcomes.

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CHAPTER 1

Introduction and Statement of the Problem

Statistics Canada (1999) estimated that by the year 2016, 16% of the Canadian population will be 65 years of age and older, compared to 12% in 1995. By 2041, 23% of the population will represent this age cohort suggesting that seniors are the fastest growing age group in the Canadian population. This projection not only represents an upward trend toward an aging population based on the post-war baby boom, but also suggests that this age group is living longer based on better health-care delivery and outcomes. Of concern is society's preparedness to meet the growing demand placed on limited health care resources. Although health resources have traditionally been allocated to the vital and strong, principally those under 65 years of age, it has become a national priority to invest in seniors' health to encourage and maintain their functional independence. Institutionalization, a trend of the past, has been replaced by a national priority to preserve functional capacity so that health decisions are controlled by the person and not by the nation. This is realized in educational programs, rehabilitation efforts, the creation of health promotion programs, and the burgeoning research that is accompanying the development of creative and alternative living arrangements to meet the diverse needs of seniors in the community.

Included in this growth trend are single elderly women who are in a low-income situation. In 1995, women made up 58% of the senior population. In 1997, 49% of unattached senior women lived below the poverty level compared to 33% of their male counterparts. This segment of the population is at risk for poor health outcomes which invariably creates a resource burden on the health care system. It is recognized in the

literature that the elderly poor are at an increased health risk because of deterrents such as limited access to health promotion programs as a result of location, cost and availability of transportation (Pastorino & Dickey, 1990). Poverty may also result in poor nutritional intake increasing the risk for poor health outcomes (Markson, 1997). Addressing the health needs and quality of life concerns of this at-risk population and delivering programs that are congruent with their needs is still in its infancy. Further research and analysis of program delivery must occur so that the expenditure of limited resources is specific, financially feasible, responsible, efficient and desirable to this age cohort.

Community-dwelling elderly people, representing the majority of the older population, constitute a group most likely to benefit from preventive care. Elderly, low-income women, at risk for poor health outcomes related to loneliness, depression and poor nutritional intake may benefit from an intervention designed to preserve relative health and well-being. White, Ham, Lipschitz, Dwyer and Wellman (1991) suggested that a nutritional intervention would benefit the 85% of older adults suffering from a chronic condition and the 40% to 59% of community-dwelling seniors who are deemed to be nutritionally at-risk. Although Canadian estimates of malnutrition, loneliness and depression related to poverty are unavailable, it is generally accepted that these variables contribute to poor health outcomes.

The literature correlates loneliness, depression and nutritional risk with poverty. Currently, no studies have analyzed these variables as outcome measures within a target group of low-income senior women experiencing an intervention program. The Active Living in the Vulnerable Elderly (ALIVE) program, a research project based at the University of Alberta, provided the opportunity to study the effects of a program on these

variables of interest. This program offered an exercise strength-training program, one-on-one informal education and counseling on nutrition and medication intake, blood pressure monitoring, information about community based programs and monthly health bulletins to a treatment group of low-income senior women over a period of eight months.

Significance of the Study

The study is significant to nurses and public health administrators in that an intervention program may identify a cost-effective strategy to improve the health status of low-income seniors. Nurses working as front-line promoters of health in the community, have an important role in the early detection of at-risk individuals. Screening efforts, initiated early, to improve nutritional status, to identify and treat depression and to curb loneliness will hopefully result in a sense of well-being for seniors who live in low-income situations.

Purpose Statement

The purpose of this study was to determine the effectiveness of a health promotion program on the variables loneliness, depression and nutritional intake in a group of low-income senior women at risk for poor health outcomes.

Research Questions

1. Is loneliness influenced by a health promotion program in low-income senior women?
2. Is depression influenced by a health promotion program in low-income senior women?
3. Is nutritional intake influenced by a health promotion program in low-income senior women?

4. How are loneliness, depression, nutritional intake, and percent change body mass index (BMI) scores related in low-income senior women?
5. Is the Nutrition Screening Initiative's (NSI) DETERMINE checklist a valid instrument?
6. Is the NSI DETERMINE checklist a reliable instrument?

Hypothesis

1. Low-income senior women who have experienced a health promotion program will be less lonely than those who have not experienced a health promotion program.
2. Low-income senior women who have experienced a health promotion program will be less depressed than those who have not experienced a health promotion program.
3. Low-income senior women who have experienced a health promotion program will be at less risk for malnutrition than those who have not experienced a health promotion program.
4. There is a relationship between loneliness, depression, nutritional risk and percent change BMI scores in low-income senior women.
5. The NSI DETERMINE checklist is a valid instrument when scores are correlated with percent change BMI scores.
6. The Determine checklist is a reliable instrument based on the Kuder-Richardson (KR-20) formula.

CHAPTER 2

Literature Review

Sullivan and Lipschitz (1997) stated that nutritional status is an important determinant of health. Nutrition, a basic requirement of life, is essential for survival and is an integral component of health, functional independence and quality of life. Fishman (1994) emphasized that "untreated malnutrition can lead to a spiral of infection, further malnutrition and death" (p. 39). For the purpose of this study, the definitions of malnutrition and under-nutrition are based on Garetz' work (1976). Malnutrition, a general term meaning faulty nutrition, is related to deficits in the process of eating or in the kinds and the amounts of food eaten. Under-nutrition, a form of malnutrition, specifically implies inadequate intake of food and/or the correct kinds of food that may lead to poor nutritional status. Poor nutritional status, for the purpose of this study, refers to poor nutritional intake resulting in weight loss, malnutrition or under-nutrition. Although poor nutritional status may be realized in weight gain, weight loss of more than 5% of baseline or 10 pounds over a period of 6 to 12 months has been shown to be a sensitive indicator of poor nutritional status (Fischer & Johnson, 1990). As the relationship between weight gain and malnutrition is less clearly defined in the literature, the objective sign of weight loss realized through percent change BMI scores will be used to identify nutritionally at-risk senior women and to validate the NSI DETERMINE checklist (Posner, Jette, Smith & Miller, 1993).

Malnutrition

Malnutrition within the geriatric population is a health care concern because it leads to gradual, progressive physical deterioration, cognitive decline (Goodwin,

Goodwin & Garry, 1983), a decreased immune response (Kaiser & Morley, 1994), frailty, the increased likelihood of other complications and mortality (Morley, 1996; Sullivan, 1995). Further to this, inadequate nutritional intake may contribute to or exacerbate the dysfunction of chronic conditions common in the aged (Barrocas, Belcher, Champagne & Jastram, 1995). It was estimated that 85% of the chronic disabilities and diseases experienced by the older person can be resolved or ameliorated by adequate nutritional intake (White, Ham, Lipschitz, Dwyer & Wellman, 1991). The consequences of inadequate food intake are difficult to reverse among elderly people (Payette, Gray-Donald, Cyr & Boutier, 1995) thus requiring early detection of the problem through screening initiatives.

It was estimated that 65% of seniors, those 65 years of age and older, admitted to hospital were protein-energy malnourished (Sullivan & Lipschitz, 1997). Morley (1997) reported that 15% of community dwelling seniors and 5% to 12% of homebound patients have inadequate nutritional intake and were malnourished. White, Ham, Lipschitz, Dwyer and Wellman (1991) reported nutritional risk among community-dwelling seniors to be as high as 40% to 59%, which emphasizes that the severity of the problem cannot be ignored by health-care professionals. Morley and Miller (1992) noted that approximately 16% of the United States population over 65 years of age ingest fewer than 1,000 kilocalories per day which is below the recommended daily allowance of 1,800 kilocalories for active elderly women and 2,400 kilocalories for elderly men (Olsen-Noll & Bosworth, 1989). This concern is by no means a current problem as Mitchell and Lipschitz (1982) reported that more than two-thirds of malnourished patients referred to a

nutrition support team during an 18 month period were over 60 years old; this was reported nearly twenty years ago.

The literature indicates that aging has no adverse consequences on caloric intake and nutritional status of healthy aging individuals (Casper, 1995; DeGroot, Van Staveren & Hautvast, 1991). Anorexia and weight loss, although not normal consequences of aging, are common findings in older persons. De Castro (1993) specified that the tendency toward decreased food intake and weight loss, however, may not result in a negative energy balance as this phenomenon may be related to a decrease in physical activity and basal metabolic rate (Morley, 1996). Although physiologic anorexia of aging may not have negative consequences on the healthy aged adult, this phenomenon can result in unintended weight loss and a sequelae of adverse health consequences in those compromised by physiological and pathological conditions. Casper (1995) indicated that anorexia leading to weight loss is suggestive of "malaise, depression, worries, anxiety or organic disease" (p. 303).

Risk factors or predictors of poor nutritional intake in community-dwelling elderly, defined as "a characteristic or occurrence that increases the likelihood that an individual has or will have problems with nutritional status" (White, Ham, Lipschitz, Dwyer & Wellman, 1991, p. 784) are numerous and are often cumulative (White, 1994). Acute and chronic conditions are the leading cause of poor nutritional intake and weight loss (Fischer & Johnson, 1990). Psychiatric illnesses such as depression and dementia are associated with decreased appetite, poor nutritional intake and weight loss (Walker & Beauchene, 1991). Polypharmacy and drug-food interactions may result in nausea, anorexia and decreased food consumption. Functional disabilities, poverty, poor

dentition, alcoholism, poor social circumstances and a recent discharge from hospital are other factors associated with poor nutritional intake (Edington, 1999; Payette, Gray-Donald, Cyr & Boutier, 1995). Markson (1997) noted that "elders living alone or with non-relatives are more likely to be poor (21%) and thus at nutritional risk than older people living with family (6%)", (p. 648). A change in taste and smell sensitivity has also been suggested as a possible cause of decreased food intake (Schiffman, 1997); investigation in this area continues.

Screening for Malnutrition. Nutrition screening is defined by Barrocas, Belcher, Champagne and Jastram (1995) as the process of "identifying characteristics known to be associated with dietary or nutritional problems" (p. 676). They define nutrition assessment as "the measurement of indicators of dietary or nutrition related factors that lead to the identification of the presence, nature, and the extent of impaired nutritional status of any type" (p. 676). An indicator is an observable recordable phenomenon that suggests the presence of poor nutritional status. Early recognition of poor nutritional status is critical to prevent morbidity and early mortality as rapid unintentional weight loss and low body weight have been associated with poor outcomes and mortality in the geriatric population (Wallace & Schwartz, 1997; Reife, 1995; Fischer & Johnson, 1990). Involuntary weight loss of more than 5% of baseline body weight or 10 pounds within a 6 to 12 month period is deemed significant and should heighten the index of suspicion for malnutrition prompting further investigation and treatment. Wallace, Schwartz, LaCroix, Uhlmann and Pearlman (1995) demonstrated in a prospective study that a weight loss of 4% to 5% over a period of one year optimally identified subjects whose weight loss was associated with increased mortality. Consensus exists that weight loss is a reliable and

sensitive anthropometric indicator of malnutrition (Barrocas, Belcher, Champagne & Jastram, 1995; Fischer & Johnson, 1990; Silver, 1993; Morley, 1997). The community health nurse, offering front-line nursing, has a pivotal role in determining nutritional status and dietary risk. As poor nutritional status usually develops insidiously (Ham, 1994), it is important to repeat measurements to assess for the manifestations of nutritional risk.

Body mass index, a formula calculated as weight (in kilograms) divided by height squared (in meters), is a measure incorporating weight against a constant (height) and is an indicator of the proportion of body fat in relation to lean body mass. Body mass index scores are widely used as an indicator of nutritional status (Reuben, Greendale & Harrison, 1995). Ideally an individual's BMI score should be between 24 to 27. A BMI score below 24 indicates that a person is underweight, whereas a BMI score above 27 indicates that a person is overweight. Consensus on BMI standards has yet to be reached for this age group; applying a standard established in a younger cohort to this heterogenous population needs to be validated. Although weight loss and BMI measurements may be considered reliable indicators of malnutrition, they provide no knowledge about the person's nutritional intake and the risk factors that predispose a person to weight loss.

The Nutrition Screening Initiative (NSI) developed the DETERMINE checklist a 10-item screen (see Appendix 1) to assess nutritional risk factors among seniors (Posner, Jette, Smith & Miller, 1993). The goal of the NSI was "to urge those at risk to seek help to ensure that nutritional problems are identified and appropriate interventions are implemented" (Lipschitz, Ham &White, 1992). Each letter of the mnemonic

DETERMINE specifies a risk for nutritional deficiency (see Appendix 2) providing the nurse with an easy to use reference tool to identify nutritionally at-risk seniors. The cumulative score ranges from 0 to 21. Subjects with a score greater than 6 are considered to be at high nutritional risk. A score of 3 to 5 inclusive indicates moderate nutritional risk and a score of 0 to 2 suggests no risk. Quinn (1997) suggested that the NSI DETERMINE checklist can provide a systematic and objective framework for assessing and meeting the nutritional needs of older persons.

Boult, Krinke, Urdangarin and Skarin (1999) tested the ability of the checklist to identify those at high risk for adverse health outcomes and found that the 10-item checklist when compared to longer questionnaires such as the Geriatric Depression Scale (GDS) and the Physical Functioning Dimension of the Sickness Impact Profile (PFD:SIP) positively identified those who were to have functional disability and depressive symptoms one year later in a population at risk for hospitalization. Although there study identified in advance those who were at high risk for hospitalization, the participants with scores between 4 and 6 had: "worse baseline functional ability (PFD:SIP, ADL, IADL), depressive symptoms (GDS), cognitive ability (MMSE), and general health; lower body mass index (BMI); fewer social contacts; and more chronic diseases and medications than those with low checklist scores" (p. 996).

The Checklist's sensitivity, specificity, and positive predictive value have been established as 46%, 85% and 56% respectively for detecting fair or poor self-rated health and 36%, 85% and 38%, respectively for detecting inadequate intake of less than 75% of the recommended daily allowance of three or more nutrients (Posner, Jette, Smith & Miller, 1993). Although the sensitivity and positive predictive values are considerably

low, Morley (1996) suggested that this screen has adequate sensitivity and specificity for epidemiological studies. He stated that this tool has been criticized for being over inclusive and as yet has not demonstrated clinical usefulness. Countering this claim, Vailas, Nitzke, Becker and Gast (1998) found that the checklist score correlated highly with global quality of life a psychosocial domain. Generally, the screen parameters are personal and environmental in nature and are thus not clinical markers of malnutrition. Nurses may use this tool to identify psychosocial risk factors which place a senior at nutritional risk. Referral and follow-up are essential components in the promotion of well-being among persons found to be at nutritional risk through this screening process.

Loneliness

Peplau and Perlman (1982) defined loneliness as an unpleasant feeling of dissatisfaction with either the number or quality of existing social relationships. This definition may suggest that a person who is satisfied with being alone would not experience loneliness and that a person who is not alone may be lonely despite social contact. Koropeckyj-Cox (1998) suggested that loneliness is an indicator of social isolation or a perceived deficiency in social relationships (p. S304). Citing theoretical work on loneliness she stated: "theoretical work on loneliness has distinguished an emotional component of isolation, which pertains to a perceived lack of intimacy, and a social component, which describes a feeling of exclusion or marginality from social ties" (p. S307). Although Koropeckyj-Cox' definition of loneliness may be helpful with respect to understanding the unfulfilled or desired need of social intimacy, it must be realized that social isolation and loneliness are not coincident. Townsend (1968) suggested that "many isolated people do not feel lonely and some integrated people do

feel lonely" (p. 272). Although being alone does not necessarily mean that one will experience loneliness, being left alone bereft of an intimate other may result in feelings of loneliness. Mullins and Dugan (1990) clarified "isolation may be a sufficient, but not a necessary condition for loneliness" (p. 377). Although these insights are helpful for understanding the causes of loneliness and the unpleasantness that is associated with the experience, they do not get at the heart of the experience of loneliness. Loneliness is a subjective, often privately unexpressed experience and therefore difficult to conceptualize and elucidate. For the purpose of this study, loneliness refers to a subjective sense of dissatisfaction with the quality or quantity of social contacts or intimate relationships.

Creecy, Berg and Wright (1985) acknowledged that loneliness is a serious problem for the elderly affecting from 12% to 40% of those aged 65 years of age and older. Harris and Associates (1975) recognized that loneliness ranked fourth out of twelve serious problems encountered by the elderly. Preceding loneliness in their survey were poor health, financial difficulties and a fear of crime. Gierveld (1998) stated that it is generally accepted that "loneliness frequently results in a decrease in well-being in the form of depression, sleeping problems, disturbed appetite and so on" (p. 77). Becker and Kleinman (1991) indicated that loneliness is an important component in understanding depression's onset and longevity. Although it is realized that loneliness and depression are not the same, loneliness and depression often co-exist. Loneliness may be regarded as a precursor to depression, whereas depression is a broader concept than loneliness which "diminishes well-being and normal functioning" (Koropeckyj-Cox, 1998, S304). Correlations between depression and loneliness have ranged from $r = .38$ to $r = .72$ (Russell, Peplau & Ferguson, 1978; Mullins & Dugan, 1990).

In a three year prospective study by Green, Copeland, Dewey, Sharma, Saunders, Davidson, Sullivan and McWilliam (1992), determining risk factors for depression in the elderly, it was found that feelings of loneliness were higher among the group that became depressed (mean = 16.98, $p < 0.0005$), whereas living alone was not a valid predictor of depression (marital status failed to be a significant risk factor). Prince, Harwood, Blizard, Thomas and Mann's (1997) cross-sectional analysis of inner city residents in London, United Kingdom, exploring social support deficits, loneliness and life events as risk factors for depression, also found that loneliness had the strongest cross-sectional association with depression with an odds ratio of 12.4 (C.I.: 7.6 - 20.0). Although loneliness was significantly correlated with depression in both studies, a causal relationship could not be demonstrated. Consequently, loneliness might be a personality trait predisposing a person to depression, or it may be a comorbid symptom of depression (Green et al., 1992).

Loneliness may adversely affect nutritional status. People who live alone are more likely to experience loneliness and decreased psychological well being which may result in inadequate dietary intake (Walker & Beauchene, 1991). Evidence addressing nutritional status among those who live alone remains inconclusive. Some studies suggest that living alone negatively influences dietary intake (McIntosh, Shifflett & Picou, 1989; Reid & Miles, 1977), while other studies have not been able to demonstrate this relationship (Schafer & Keith, 1982). Walker and Beauchene (1991) found that there was at best a weak relationship between loneliness and dietary adequacy ($r = -.28$) among 58 elderly participants. In their study examining the relationship between loneliness, social isolation, physical health and dietary adequacy among independent elders, they found

that increasing the number of social contacts had little influence on food consumption. The findings of this study are difficult to interpret as the quality of the social/relational intervention was not clearly defined. De Castro, Brewer, Elmore and Orazco (1990), on the other hand, found that socialization had a positive influence on nutritional intake. It is evident, based on the limited body of literature and the inconclusive results of these investigations, that further inquiry is required in this area.

Theoretically, the preparation and sharing of food has deep social and symbolic meaning. According to Quinn (1997), the person who consistently eats alone loses the social aspects of a meal that are very much a part of one's psychological well-being. Eating alone may result in a disinterest in the preparation and consumption of food. Markson (1997) theorized that meal-times for the bereft person increases sadness because of an association with memories of happier times which may result in reduced intake. In sadness and isolation, the motivation to prepare a meal to be eaten by oneself alone may be lacking. Roughan (1993) commented that the "social structures surrounding the family meal have broken down because of poverty, widowhood, social isolation, physical disability or a combination of these factors" (p. 184). It may be within this context that 16% of whites over the age of 60 years ingest less than 1,000 kilocalories a day and this percentage rises to 27% among those with income levels below the poverty line (Olsen-Noll & Bosworth, 1989).

Depression

Depression is the most common psychiatric disorder in later life (Morley, 1996) affecting 5% to 10% of community-dwelling elderly (Wallace & Schwartz, 1997); it is not a normal consequence of aging. Depression has been regarded as a measure of

psychological distress with clinical consequences (Koropexkyj-Cox, 1998) and is "one of the most important treatable causes of weight loss in older persons" (Morley, 1997, p. 765). Roughan (1993) stated "depression is best viewed as the final common pathway of social and psychological factors acting on biological systems in susceptible individuals" (p. 175). Significant correlates to depression in community dwelling populations include lower socio-economic status and poverty, female gender, older age, marital status, having poor social support, having severe medical disability, lower functional status and poor self-reported health (Markson, 1997; Sullivan, 1995). Age related life experiences, such as the loss of a spouse, can predispose the susceptible person to depression. Segrin (1994) suggested that advanced aging accompanied by decreased mobility, deteriorating health and the experience of loss related to the death of family and peers, property and health increases the person's vulnerability for experiencing episodes of depression. For the purpose of this study, depression is a measure of distress related to the individual or cumulative losses that may result in a decreased sense of well-being and poor health outcomes.

Morley and Miller (1992) indicated that depression is a powerful predictor of weight loss and anorexia in older persons and that weight loss is an important indicator of impending malnutrition. They recommended the need to screen for depression to rule out malnutrition. When depression is present, loss of self-worth, indecisiveness and cognitive loss may result in reduced intake and poor nutritional status (Ham, 1994). Depression may lead to apathy and a decreased ability to care for oneself. Many elderly people with depression may feel that "it is not worthwhile" to prepare a meal for oneself (Markson, 1997, p. 649). Consequently, the depressed person may not shop for groceries or prepare

food items resulting in a heightened risk for poor nutritional intake and malnutrition (Blazer & Williams, 1980).

Research positively correlates nutritional deficits and weight loss with depression (Thompson & Morris, 1991). Morley and Morley (1995) indicated that about 60% of younger individuals compared to 90% of older individuals experience weight loss related to depression. Although Garetz (1976) noted that under-nutrition and depression can "combine to produce a self-sustaining downward spiral in an elderly person's clinical state" (p. 73), the direction of the relationship between these variables is difficult to interpret because poor nutrition can also lead to symptoms of depression. "Depression frequently causes anorexia and weight loss, while under-nutrition or deprivation of food can lead to a syndrome of depression" (Garetz, 1976, p. 73). Although an association between weight gain and depression exists, the relationship is less clearly defined in the literature. Morley and Miller (1992) suggested that being "underweight is more significant than being overweight as a risk factor for death" (p. 95). As weight loss is a sensitive indicator of malnutrition and poor nutritional status (Fischer & Johnson, 1990), this study will correlate percent change BMI scores with the NSI DETERMINE checklist to determine concurrent validity.

Loss. Perlman (1988) suggested that as far as older adults are concerned, the loss of a partner and deteriorating health are considered to be the most important determinants of loneliness and subsequent depression. Among those aged 85 years and older, over 75% are widowed (Myers, Weissman, Tischler, Holzer, Leaf, Orvaschel, Anthony, Boyd, Burke & Kramer, 1984). Widowhood in this age group is largely a woman's experience (Statistics Canada, 1999). Some studies have concluded that loneliness is the direct result

of loss (Applebaum, 1978; Kurtz, 1983; Townsend, 1968). Herth (1995) indicated that loss leads to antecedants of loneliness such as decreased levels of social participation, time spent alone and a weakened sense of control.

The elderly more than any other cohort are prone to multiple losses where one loss can lead to the loss of other unrelated losses or to cumulative losses. The loss of a husband for instance can result in the selling of property, relocation and loss of social ties. "Losses, small and large, numerous and irreplaceable, may snowball and thus overwhelm the individual" (Newbern, 1992, p. 22). The loss of income may prevent the person from maintaining social contacts resulting in social isolation. Loss of functional independence and health may result in a lack of energy or resources to maintain bonds of intimacy. Loss of living arrangements and relocation may remove the person from their social network. Loss of spouse, children and friends "can diminish the number of meaningful relationships, and gradually isolate the older person" (Garrett, 1987, p. 8), resulting in loneliness and depression. Shearer and Davidhizar (1994) stated that "when death or a changed living arrangement separates an elderly woman from her husband, the psychological support of a relationship that met human intimacy needs for many years is lost" (p. 61). Freeman (1984) suggested that loss may be regarded as "irrefutable evidence of a process of continuing loss in which they can expect additional ones; the losses may be considered more threatening to survival and to the balance of needs and resources than those experienced at any other age" (p. 288). Loss then may result in distress and despair if the loss grieved is not resolved or if the cumulative losses overwhelm the coping capacities and resources available to resolve the losses (Freeman, 1984).

Poverty. Statistics Canada (1999) estimated that 18.7% of persons aged 65 years and older were in a low-income situation. Morley and Morley (1995) found that poverty was a major cause of food insecurity and weight loss. Elderly women living alone disproportionately have a higher risk of malnutrition than men as they are more likely to live at or below the poverty level (Markson, 1997). Statistics Canada (1999) also estimated that 24% of women compared with 11.7% of men had low incomes in 1997. White (1994) suggested that reasons for poor nutritional status related to low income include lack of food variety, inadequate intake of specific food groups and important vitamins and minerals, excess consumption of fatty foods and inadequate caloric consumption. Individuals in low-income situations may have to balance financial priorities ascribing more weight to the payment of bills and securing ownership of what belongs to them (Markson, 1997). Placing a high priority on the consumption of foods that meet dietary standards may not be realistic when telephone, utility and rent bills need to be paid. Barrocas, Belcher, Champagne and Jastram (1995) stated that individuals with a decrease in funds, "who have unreliable sources of income, or rely on economic assistance programs are at high risk for malnutrition and should be carefully monitored and reassessed with extra attention paid to body weight and eating habit changes" (p. 694).

CHAPTER 3

Methods and Procedures

Low-income senior women were invited to participate in the intervention program called the ALIVE program. This program provided seniors with the opportunity to participate in an on-site program which would not have been available to them otherwise. Participant outcomes of loneliness, depression, nutritional risk and percent change BMI scores were analyzed within the context of an experimental design.

Design

An experimental, two group, post-test, cross-sectional analysis was used to study the effectiveness of the ALIVE health promotion program on outcomes of loneliness, depression, nutritional risk and percent change BMI on senior women, 60 years of age and older, living in a low-income situation defined by their living arrangements. This study is part of the larger ALIVE study which used a repeated measures, quasi-experimental, two group design to evaluate the impact of a health promotion program on the health of seniors living in subsidized apartment buildings. The variables health status, functional status, social participation, cognitive status, quality of life, health care utilization and loneliness were studied in the ALIVE project. The ALIVE program which included a strength-training program, wellness education, one-on-one informal counseling in a variety of areas and progress report bulletins was presented to a treatment group. To determine the effectiveness of the ALIVE program on the variables depression and nutritional risk, an independent study was conducted using post-test measurements of these variables within the context of the research design used in the ALIVE study. The loneliness variable used in the ALIVE study was incorporated within the context of this

study to support the assumption that the treatment and control groups were the same at the outset as baseline scores for depression and nutritional risk were not obtained, to perform a pre and post treatment analysis of this variable to obtain a measure of difference and to correlate it with the variables of interest.

The sample was obtained in the following way. Sixty-one subsidized housing units or apartment complexes housing seniors were stratified on the basis of building size. Building size ranged from small to large with small buildings having fewer than 51 units (35%) and larger buildings having over 150 units (19%). The apartment buildings were randomly selected from the total number of buildings (61). Random assignment of selected buildings to experimental and control groups took place, and subjects were recruited from within the buildings. Residents were invited to participate in the study through a letter explaining the research project to the resident managers of each site and then a letter was distributed to each resident throughout the apartment complex. Residents interested in the ALIVE project participated in the development of the program congruent with their needs and interests.

Data Analysis

Descriptive data such as the mean, median, mode and standard deviation were computed. T-test analysis was used to determine whether the intervention program created a statistically significant reduction in the outcomes of loneliness, depression, nutritional risk and percent change BMI scores. The paired sample t-test was used to determine before and after treatment significance for the loneliness variable to validate the results obtained from the post-test between group t-test analysis . The level of significance was set at .05. The magnitude of the relationship between the variables

loneliness and depression, loneliness and nutritional risk, depression and nutritional risk and percent change BMI correlated with these variables were analyzed using Pearson-r. Criterion validity of the NSI DETERMINE checklist was determined by correlating percent change BMI scores with nutritional risk scores. Reliability of the NSI DETERMINE checklist was established using the KR-20 formula.

Population and Sample Size

The target population consisted of female seniors aged 60 years and older living in a low-income situation as defined by their qualification to live in subsidized accommodations. This sample of seniors lived in seniors' apartments in Edmonton and area subsidized by the provincial government with rents indexed according to income. The buildings are operated by a number of groups, the largest being the Greater Edmonton Foundation. Although seniors apartment buildings provide a level of security which may have not been previously realized by this population, they also remove seniors from their neighborhoods which may increase isolation. Eighty-one seniors from seven apartment complexes participated in the intervention and comprised the experimental group; seventy seniors from seven apartment complexes comprised the control group. A total of 151 seniors were involved in this study.

Intervention Program

The ALIVE program consisted of the following intervention. An exercise program created by Fiatarone (1996) was the main focus of the program and was offered twice a week to the experimental group to strengthen the major muscle groups: two pound weights and thera-band (medium weight) were used for this purpose. Stretching exercises were performed before and after the strength training exercises to ensure that

the muscles were warmed-up and cooled down appropriately. A cardiovascular component of walking on the spot for three minutes was also incorporated into the exercise program. It must be emphasized that the exercise program was adapted to meet the needs of seniors in each apartment complex.

Health corner support offering informal education and counseling on medication intake, nutrition and services available in the Edmonton community and blood pressure monitoring were held at each site on a weekly or bi-monthly basis depending on participant preference. At each health corner nutrition students, pharmacy interns and senior nursing students answered questions in their related fields. Questions were answered informally on an individual basis and pamphlets were available in each of the respective buildings to promote independence and well-being. During each health corner session the nurse or nursing student would take the participant's blood pressure. Appointments could be scheduled in advance by the participants to ensure efficient delivery of service.

Another intervention was the distribution of a newsletter generated by the coordinator of the project. The bulletin included nutrition ideas, recipes, exercise related issues and the overall progress of the ALIVE project.

The purpose of the ALIVE program was to proactively address the needs of at-risk seniors living in relative poverty, to support independent living and to evaluate the impact of this program on the health of this group of seniors through the use of various outcome measures. The ALIVE program encouraged a healthful lifestyle by promoting wellness through its various program activities. Several outcomes were measured, as discussed in the next section, to determine its effect on overall quality of life.

Data Collection and Instrumentation

The current research was an integral part of the larger ALIVE project. Baseline data on the following variables was gathered in the ALIVE project: demographic data (age, gender, marital status, education, blood pressure, height and weight); perceived health status; functional status including instrumental activities of daily living (use of telephone, transportation, shopping, meal preparation, housework, medication administration and money management) and physical activities of daily living (eating, dressing, grooming, walking, transferring, bathing and toileting); cognitive status using the Modified Mini-Mental State exam.; quality of life using the Self-Anchoring Striving scale; loneliness using the UCLA Loneliness scale and health care utilization using the Health Care Utilization Record. Repeated measures of these parameters were performed twice at four month intervals over the eight month period of the intervention program. The 15-item Geriatric Depression Scale and the ten item NSI DETERMINE checklist were added to the study for the third data collection point and thus one set of post-test measurements was obtained for these variables. The questions were read aloud to the participants to control for limited reading skills related to poor eyesight or poor comprehension of the English language.

Loneliness Scale. The revised UCLA Loneliness Scale (see Appendix 4), used in the larger study, is a 20-item four point rating instrument that assesses a person's satisfaction with social relationships yielding a global index of loneliness. The 20-item questionnaire has 10 positively worded items and 10 negatively worded items. Responses are scored by using an interval scale of 1 to 4 (never = 1, rarely = 2, sometimes = 3 and often = 4). For higher scores to reflect greater levels of loneliness, positively worded

items (1, 4, 5, 6, 9, 10, 15, 16, 19 and 20) were reversed on the 1 to 4 scale (never = 4, rarely = 3, sometimes = 2 and often = 1), (Russell, 1996). The range of possible scores for this instrument is between 20 and 80 with a midpoint of 50. The UCLA Loneliness scale was the outcome of extensive use and testing of an initial version of the scale (Russell, Peplau & Cutrona, 1980). The revised scale has subsequently been used to assess loneliness in a variety of populations. Internal consistency is supported by alpha coefficients as high as r = .94 (Russell, Peplau & Cutrona, 1980). Construct validity has been supported through a correlation with another instrument (r = .89), (Solano, 1980).

Geriatric Depression Scale. The 15-item Geriatric Depression Scale (GDS), (see Appendix 3) is a shortened version of the longer 30-item GDS developed by Yesavage, Brink, Rose, Lum, Huang, Adey and Leirer (1983), (Mullins & Duggan, 1990). The 15-item scale was chosen based on its current use in the Capital Health Region located in Edmonton, Alberta, Canada. The GDS is scored by totaling all the points allotted for each depressive answer: a zero point is given for each non-depressive answer and one point is allotted for each depressive answer for a total of 15 points. A person scoring greater than 7 may be at risk for depression and further follow-up is warranted. The 30-item scale has excellent internal consistency with an alpha coefficient of .94 (Yesavage, Brink, Rose, Lum, Huang, Adey & Leirer, 1982). The GDS has excellent concurrent validity, with a correlation of .84 between the GDS and Zung's Self-Rating Depression Scale (1965) and .83 with the Hamilton Rating Scale for Depression (1960), (Yesavage et al., 1982). The shorter 15-item GDS is highly correlated ($r = .84$, $p < .001$) to the longer 30-item scale in differentiating depressed from non-depressed subjects (Sheikh & Yesavage, 1986).

NSI DETERMINE Checklist. The Nutrition Screening Initiative's DETERMINE checklist was used to identify those at nutritional risk (see Appendix 1), (Posner, Jette, Smith & Miller, 1993). The 10-item questionnaire can be used by community nurses to screen for nutritionally at-risk seniors. The cumulative score can range between 0 and 21. Subjects with a score greater than 6 are considered to be at high nutritional risk; a score between 3 and 5 inclusive indicates moderate nutritional risk and a score of 0 to 2 inclusive is suggestive of no risk. To determine nutritional risk relative to weight loss, since weight loss is considered to be a sensitive indicator of malnutrition, question 9 of the screen was reworded. Question 9 was revised from the original version which asked, "without wanting to, I have lost or gained 10 pounds in the last six months" to read as follows: "without wanting to, I have lost 10 pounds in the last eight months". The claim that the checklist has been validated in groups of elderly living in the community (White, 1996) is not supported in the literature. White (1996) indicated, however, that when the instrument is used for its intended purpose of "increasing public awareness of the importance of nutrition and health, initiating a dialogue between the older person and health care professionals regarding personal nutritional concerns, and as a measure of potential increased nutritional risk, it is valid and reliable" (p. 91). As no values of reliability and validity have been reported for this instrument, these values need to be obtained and reported to give merit to the screen.

Limitations of the Study

A limitation may be encountered by incorporating a cross-sectional post-test analysis within the context of a repeated measures experimental design. As this study is a cross-sectional analysis of the means of variables between groups, inferences of causality

may not be supported without baseline data analysis. As baseline scores of depression and nutritional status were not obtained because these variables were attached to the larger study, the opportunity to follow the subjects on measures of these variables throughout time was not possible and therefore a departure from the rigors of the experimental design occurred. Although it can be argued that the two groups are equal based on random assignment of buildings to groups, and baseline scores should reflect the control group's post-test measures related to the absence of an intervention, such an assumption may not be correct and inferences of causality may not be supported.

This study is specific to senior women 60 years of age and older living in a low-income situation. It is specific to age, gender, income and location. Consequently, external validity is limited to this specific cohort and results should not be applied to senior groups in different circumstances.

Ethics

Participation in the research project and in the health promotion activities was voluntary. Information about the ALIVE program was posted in the selected buildings and written information about the study was sent to each resident inviting participation and/or attendance at information meetings; a telephone number was provided to join the study. Signed consent forms were obtained from all participants and participants were assured of their right to withdraw from the study at any time. Participants were informed of the change to the ALIVE project protocol related to the two additional questionnaires attached to the study. To protect confidentiality, subjects' names were not used in the data reports, and only grouped data was used in the research analysis. No risk of harm or injury to the subjects was expected during this study.

CHAPTER 4

Results

This chapter presents the results of the ALIVE intervention on the variables of loneliness, depression and nutritional risk. To begin, descriptive statistics will be presented followed by an analysis of the results. The t-test results determining significance of the intervention on the treatment group will be presented first followed by the correlational analysis. A discussion of the validity and reliability of the NSI DETERMINE checklist will follow.

Descriptive Statistics

One hundred and fifty one senior women aged 60 years of age and older were involved in this experimental cross-sectional study; two subjects were excluded from the analysis because they did not meet the inclusion criteria set at 60 years of age and older. Based on this sample 81 seniors (53.6 %) were involved in the treatment group and 70 seniors (45.8%) comprised the control group. The mean age of the study sample was 77.14 with a standard deviation (s.d.) of $\pm$ 8.08. The mean ages of the treatment and control groups were 78.62 (s.d. $\pm$ 7.69) and 75.43 (s.d. $\pm$ 8.23) respectively. The mean of the study sample and means of both groups within this sample were close and are situated within the same age subcategory as cited in Table 4.1. Age was subcategorized into five year intervals to determine the frequency and percentage of subjects within each subgroup.

The majority of seniors in this sample were widowed (97 seniors, 64.2%), 28 seniors (18.5%) were divorced, 11 seniors (7.3%) were married, 8 seniors (5.3%) were never married, and 7 seniors (4.6%) were separated. Fifty-four percent of subjects in the

treatment group and 43% of subjects in the control group were widowed with the mean of each group (treatment: 3.20, s.d. ± .98, control: 3.27 s.d. ± 1.07) reflecting this experience when this variable was recoded to reflect the differences in marital status (see Table 4.2).

The number of years of formal education varied with 60 seniors (39.7%) having grade 10 - 13 education, 43 seniors (28.5%) having grade 7 - 9 education, 19 seniors (12.6%) having completed post-secondary education, 14 seniors (9.3%) having some post-secondary education with the same frequency and percent applying to grade 1 - 6 and one senior (0.7%) having no formal education. The mean number of years of formal education, however, did not change between groups with the mean level of education being from grade 10 - 13 when this variable was recoded and values were rounded to the closest whole number (see Table 4.3).

Table 4.1
Age of Sample

Age Groups	Frequency	Percent
0 (60 – 65)	T: 5 C: 9	6.2% 12.9%
1 (65 - 70)	T: 10 C: 15	12.3% 21.4%
2 (70 – 75)	T: 10 C: 8	12.3% 11.4%
3 (75 – 80)	T: 19 C: 13	23.5% 18.6%
4 (80 – 85)	T: 21 C: 18	25.9% 25.7%
5 (85 – 90)	T: 14 C: 6	17.3% 8.6%
6 (90 – 95)	T: 2 C: 1	2.5% 1.4%

Mean of sample 77.14 (s.d. ± 8.08), treatment 78.62 (s.d. ± 8.25) and control 75.43 (s.d. ± 8.25).

Table 4.2
Marital Status

Marital Status	Frequency	Percent
1 (never married)	T: 3 C: 5	3.7% 7.1%
2 (married)	T: 8 C: 3	9.9% 4.3%
3 (widowed)	T: 54 C: 43	66.7% 61.4%
4 (separated)	T: 2 C: 5	2.5% 7.1%
5 (divorced)	T: 14 C: 14	17.3% 20.0%

Mean of sample 3.24 (s.d. $\pm$ 1.01), treatment 3.20 (s.d. $\pm$ .97) and control 3.29 (s.d. $\pm$ 1.07).

Table 4.3
Level of Education

Number of Years of Formal Education	Frequency	Percent
1 (no formal education)	T: 1 C: 0	1.2% 0 %
2 (grade 1-6)	T: 6 C: 8	7.4% 11.4%
3 (grade 7-9)	T: 27 C: 16	33.3% 22.9%
4 (grade 10-13)	T: 35 C: 25	43.2% 35.7%
5 (some post-secondary education)	T: 7 C: 7	8.6% 10.0%
6 (completed post-secondary education)	T: 5 C: 14	6.2% 20.0%

Mean of sample 3.85 (s.d. $\pm$ 1.14), treatment 3.69 (s.d. $\pm$ .99) and control 4.04 (s.d. $\pm$ 1.29).

Mean post-test scores for loneliness as measured on the UCLA Loneliness Scale between the treatment and control groups were 31.17 (s.d. $\pm$ 7.93) and 35.07 (s.d. $\pm$ 10.27) respectively and the mean scores before and after treatment for the treatment group were 31.95 (s.d. $\pm$ 8.11) and 31.17(s.d. $\pm$ 7.94) respectively; the mean baseline loneliness score for the control group was 31.76 (s.d. $\pm$ 11.70). As the possible range of scores is between 20 and 80 inclusive with a midpoint of 50, whereby a score below 50 indicates a low risk for loneliness and a score above 50 suggests a higher risk for

loneliness, it is apparent that a low to moderate level of loneliness was experienced by the sample based on the mean scores. Scores ranged between 20 and 78 pretreatment and between 20 and 72 post-treatment for the entire sample. The majority of the sample (60.8%) scored at or below the pretest loneliness mean (31.86), whereas 61.6% scored at or below the post-test loneliness mean (32.98).

The mean score for depression as measured on the GDS for the treatment versus control group was 2.33 (s.d. $\pm$ 2.39) and 2.97 (s.d. $\pm$ 2.84) respectively reflective of a low mean experience of depression between groups. Scores below seven on the GDS are suggestive of a low level of depression whereas scores above seven may suggest a depressive illness. The mean for the entire sample was 2.63 (s.d. $\pm$ 2.62) with approximately 78.4% of the sample scoring at or below this mean. The range of scores was between 0 and 14 inclusive with a small percent of the sample (7.9%) scoring above the midpoint on the GDS.

The mean score for nutritional risk for treatment versus control group was 2.62 (s.d. $\pm$ 2.31) and 3.67 (s.d. $\pm$ 3.09) respectively indicating a moderate risk for poor nutritional intake for the control group. Scores from 0 to 2 indicate no nutritional risk, 3 to 5 indicates moderate nutritional risk and a score of 6 or greater suggests a high risk for poor nutritional intake. Forty-nine percent of the sample scored below 2 on the scale indicating no nutritional risk, 37.0% demonstrated moderate nutritional risk and 14% demonstrated severe nutritional risk.

Additionally, mean pre-test BMI scores for treatment versus control group were 28.03 (s.d. $\pm$ 6.57) and 29.20 (s.d. $\pm$ 5.66) respectively and mean post-test BMI scores for treatment versus control groups were 30.53 (s.d. $\pm$ 13.59) and 28.84 (s.d. $\pm$ 5.51)

respectively indicating that the overall sample was overweight based on current BMI standards. Pretreatment versus post treatment percentage of subjects being over-weight, under-weight and within the acceptable BMI range of 24 to 27 respectively were as follows: 53.6% versus 60.3%, 24.5% versus 23.8% and 21.9% versus 15.9%. Mean percent change BMI scores for treatment versus control groups were –10.48% (s.d. ± 57.75) and .76% (s.d. ± 9.49) respectively. As the variance for the treatment group was large in comparison to the control group the data was re-analyzed to account for this occurrence. With the elimination of four subjects from the treatment group, as weight loss for these subjects was greater than 100% during the eight month period of the study, the respective means for the treatment versus control group were -.16% (s.d. ± 7.28) and .76% (s.d. ± 9.49) respectively. The congruence of variance between groups associated with the elimination of these subjects more realistically reflects percent change BMI or average weight loss over the eight months of the study.

Based on the previous mean values it is clear that the values for the treatment group were lower than the control group. Although the mean values for the control group were higher, the intervention's significance in reducing the experience of loneliness, depression and nutritional risk needs to be established.

T-test Analysis

T-test analysis was performed to determine whether the intervention significantly reduced scores of loneliness, depression and nutritional risk between groups and a paired sample t-test was used to determine whether the intervention was successful in significantly reducing loneliness for those receiving the intervention between test times. The t-test is appropriate when significance between two independent groups is analyzed

and the paired sample t-test is appropriate to establish the credibility of the t-test analysis of the post-test findings between groups when repeated measurements on a variable are obtained. One tailed analysis was used based on the nature of the hypotheses which posited that there would be less loneliness, depression and nutritional risk in the treatment group than in the control group; the level of significance was set at .05 meaning that 5% error would be tolerated.

Research Question 1. Question one queried whether loneliness would be influenced by a health promotion program in seniors. It was hypothesized that low-income senior women who had experienced a health promotion program would be less lonely than those who had not experienced a health promotion program. Based on the one tailed t-test analysis significance was demonstrated ($p = .00$). Although this test analysis supports the hypothesis that the treatment group experiencing a health promotion program would be less lonely than the control group the paired sample t-test did not demonstrate significance ($p = .16$) between pre and post test measures for the treatment group and it is therefore realized that the intervention did not significantly reduce loneliness for this group. As mean scores for loneliness between groups and between time periods were well below the midpoint on the UCLA Loneliness Scale, any significant reduction over time would raise the issue of what gains would be realized with a further reduction to loneliness. Item analysis using the paired sample t-test was conducted to determine which items were significant within the questionnaire. Table 4.4 summarizes the results with significance realized for items 2, 4, 15 and 18.

Table 4.4
Paired Sample t-test of UCLA Loneliness Scale

Question	Pre & Post Test	Mean	S.D.	p-value
1. I feel in tune with people	Pre-test Post-test	1.38 1.30	± .64 ± .58	.13
2. I lack companionship	Pre-test Post-test	2.00 1.77	± .98 ± .94	.02
3. There is no one I can turn to	Pre-test Post-test	1.38 1.44	± .77 ± .89	.27
4. I do not feel alone	Pre-test Post-test	1.93 2.23	± 1.06 ± 1.24	.04
5. I feel part of a group of friends	Pre-test Post-test	1.40 1.40	± .74 ± .70	.50
6. I have a lot in common with others	Pre-test Post-test	1.62 1.59	± .86 ± .79	.40
7. I am no longer close to anyone	Pre-test Post-test	1.38 1.37	± .77 ± .73	.45
8. My interest & ideas are not shared by others around me	Pre-test Post-test	2.16 2.21	± .96 ± .97	.37
9. I am an outgoing person	Pre-test Post-test	1.75 1.62	± .90 ± .77	.06
10. There are people I feel close to	Pre-test Post-test	1.22 1.21	± .50 ± .41	.42
11. I feel left out	Pre-test Post-test	1.49 1.51	± .78 ± .81	.45
12. My social relationships are superficial	Pre-test Post-test	1.99 1.86	± .92 ± 1.00	.18
13. No one really knows me very well	Pre-test Post-test	2.00 2.11	± 1.00 ± 1.11	.21
14. I feel isolated from others	Pre-test Post-test	1.46 1.38	± .78 ± .75	.19
15. I can find companionship when I really want to	Pre-test Post-test	1.28 1.16	± .58 ± .37	.04
16. There are people who really understand me	Pre-test Post-test	1.46 1.38	± .67 ± .58	.18
17. I am unhappy being so withdrawn	Pre-test Post-test	1.43 1.35	± .76 ± .69	.16
18. People are around me but not with me	Pre-test Post-test	2.25 1.96	± 1.04 ± .90	.02
19. There are people I can talk to	Pre-test Post-test	1.20 1.20	± .43 ± .46	.50
20. There are people I can turn to	Pre-test Post-test	1.17 1.12	± .44 ± .33	.14
Total	Pre-test Post-test	31.95 31.17	± 8.11 ± 7.94	.16

Research Question 2. Question two inquired whether depression would be influcnced by a health promotion program. The hypothesis speculated that low-income senior women who had experienced a health promotion program would be less depressed than those who had not experienced a health promotion program. One tailed t-test analysis revealed that scores of depression for the treatment group were not significantly ($p = .07$) influenced by the intervention although the result was just slightly greater than the .05 significance level that had been set in advance. Although the mean score of depression was not significantly influenced by the intervention for the treatment group, mean depression scores between groups were low with mean scores being well below the midpoint of the scale. Item analysis was performed to determine if significance was realized for items not realized by the overall GDS scale. The analysis yielded significance for questions 2, 3, 8 and 10 (see Table 4.5).

Table 4.5
Geriatric Depression Scale Analysis

Question	Groups	Mean	S.D.	p-value
1. Basically satisfied with life	T C	.09 .07	.30 .26	.28
2. Dropped activities and interests	T C	.25 .37	.43 .49	.05
3. Life is empty	T C	.07 .16	.26 .37	.05
4. Often get bored	T C	.17 .19	.38 .39	.42
5. Good spirits most of time	T C	.08 .08	.28 .28	.49
6. Afraid something bad will happen	T C	.09 .11	.30 .32	.38
7. Feel happy most of time	T C	.07 .07	.26 .26	.48
8. Often feel helpless	T C	.06 .17	.24 .38	.017
9. Stay at home at night	T C	.69 .64	.46 .48	.27
10. More problem with memory	T C	.07 .23	.26 .42	.004
11. Wonderful to be alive now	T C	.07 .04	.26 .20	.21
12. Worthless the way you are now	T C	.09 .14	.30 .35	.20
13. Full of energy	T C	.35 .46	.48 .50	.08
14. Your situation is hopeless	T C	.06 .09	.24 .28	.29
15. Most people are better off than you	T C	.07 .14	.26 .35	.09
Total	T C	2.33 2.97	2.39 2.84	.07

Research Question 3. Question three queried whether nutritional risk would be influenced by a health promotion program. The hypothesis that low-income senior women experiencing a health promotion program would be at less risk for malnutrition than those who have not experienced a health promotion program may be supported by this study ($p = .01$). An analysis of each item to determine where significance was realized is summarized in Table 4.6. Questions 3, 6 and 10 were significantly less of a concern for the treatment group than the control group. The treatment group mean values

for these questions are below the control group mean values and therefore the treatment group is considered significantly at less risk in these areas than the control group.

Table 4.6
NSI DETERMINE Checklist Analysis

Question	Groups	Mean	S.D.	p-value
1. Illness made me change nutritional intake	T C	.72 .57	.96 .91	.17
2. Eat fewer than 2 meals per day	T C	.11 .30	.57 .91	.06
3. Eat few fruits vegetables or milk products	T C	.07 .43	.38 .83	.00
4. 3 or more beer, liquor or wine almost everyday	T C	.00 .00	.00 .00	T cannot be computed
5. Tooth or mouth problems making it hard to eat	T C	.20 .20	.60 .60	.49
6. Not enough money to buy food needed	T C	.05 .40	.44 1.21	.008
7. Eat alone most of time	T C	.79 .79	.41 .41	.49
8. Three or moreover the counter drugs per day	T C	.33 .36	.47 .48	.38
9. Loss of 10 pounds in last 8 months	T C	.15 .23	.53 .64	.20
10. Not always able to cook, shop and/or feed self	T C	.20 .40	.60 .81	.04
Total	T C	2.62 3.67	2.31 3.09	.01

Further to the investigation, a one tailed t-test analysis for percent change BMI scores between groups, with the elimination of the four data sets which presented as spurious, suggested that the intervention was not significant ($p = .25$) in altering weight between groups.

Research Question 4. Correlation analysis using Pearson-r was used to answer question four. Pearson-r is appropriate for this analysis in that a dichotomous scale can be construed as continuous when a total score is achieved. This is also supported by the normal approximation to the binomial whereby when 'n' increases the "symmetrical binomial is more closely approximated by the normal distribution" which is continuous

and not discrete (Ferguson, 1976, p. 97). Statistically, the closer the relationship is to 'one' the stronger the relationship, whereas, the closer the value is to 'zero' the weaker the proposed relationship. Question 4 asked how loneliness, depression and nutritional risk are related in elderly people? A significant but moderate relationship between loneliness and depression was revealed ($r = .48$, $p = .00$) at the .01 level (two-tailed). This indicates that 23% of the variance in loneliness is explained by depression and visa-versa. A relatively weak but significant relationship was revealed between loneliness and nutritional risk ($r = .35$, $p = .00$) indicating that 12% of the variance in loneliness is explained by nutritional intake or risk. There was a relatively weak correlation between depression and nutritional risk ($r = .39$, $p = .00$) indicating that 15% of the variance in depression is explained by nutritional risk. Table 4.7 summarizes the correlational values that are significant.

Research Question 5. Question five was concerned with the validity of the NSI DETERMINE checklist. When correlating nutritional risk scores with mean percent change BMI scores (using baseline data obtained at the beginning of the study and post-intervention scores) a weak non-significant relationship was demonstrated between the two variables ($r = .10$, $p = .21$; see Table 4.7). Based on this relationship, the hypothesis that the screen is a valid instrument is not supported. When eliminating the data that presented as spurious for percent change BMI, the nature of this relationship did not change. It may be, however, that percent change BMI scores are not an appropriate index to determine the validity of the nutritional screen. As no other instruments were used in the study, it was not possible to do further comparisons. Further discussion about the nature of this relationship will be presented in Chapter 5.

Table 4.7
Correlation Matrix

Variables	Correlations		
	1	2	3
1. Loneliness			
2. Depression	.479*		
3. Nutritional Status	.348*	.391*	
4. Percent Change BMI	.069	.085	.103

* Significant at the .01 level

Reliability Analysis

Reliability analysis was performed on the NSI DETERMINE checklist using Kuder-Richardson formula 20 as discussed in Ferguson (1976) and its calculation is presented in Appendix 5. This formula is appropriate to establish internal consistency of the test material for dichotomous items. The reliability coefficient will be high, if the "items on the test have high intercorrelations with each other and are measures of much the same attribute" (Ferguson, 1976, p. 429). The assumption made using this formula is that all items are of equal difficulty and have equal weight. Although it may be assumed that the items are of equal difficulty they have been assigned different weights as demonstrated in the checklist. To determine internal consistency the average weight of each question was established at 2.1 (the mean for each item in the screen) and the mean and variance of scores obtained from the sample on the NSI DETERMINE checklist was divided by this number. The reliability coefficient $r = .72$ indicates that the scale has a moderate level of internal consistency reliability. LoBiondo-Wood and Haber (1994) indicated that "coefficients of reliability of .70 or higher are desirable" (p. 381).

CHAPTER 5

Discussion

This study may provide evidence of the efficacy of an intervention consisting of exercise, nutritional counseling with health corner support and education in decreasing nutritional risk among senior women of low-income status. Although loneliness and depression were not significantly reduced by the intervention it was realized in the data that mean scores for both variables were low. A positive and significant relationship was realized between depression and loneliness, depression and nutritional risk and loneliness and nutritional risk. Percent change BMI did not correlate with the NSI DETERMINE checklist perhaps calling into question instrument validity. However, it may also be that percent change BMI scores are not an appropriate index for comparison with the nutritional risk screen. The nutritional risk screen was determined to be reliable with a correlation coefficient of .72. A systematic discussion of the results follows.

Loneliness, for the purpose of this study, referred to the dissatisfaction associated with the quality and quantity of social contacts and intimate relationships. The level of dissatisfaction was measured quantitatively using the UCLA Loneliness Scale. This instrument is a 20-item questionnaire with 10 positively worded items and 10 negatively worded items. Responses were scored by using an interval scale of 1 to 4 (never = 1, rarely = 2, sometimes = 3 and often = 4). Positively worded items (1, 4, 5, 6, 9, 10, 15, 16, 19 and 20) were reversed on the 1 to 4 scale (never = 4, rarely = 3, sometimes = 2 and often = 1) with higher scores indicating greater loneliness. The range of possible scores for this instrument is between 20 and 80 with a midpoint of 50. Dissatisfaction with the lack of social and intimate relationships based on the low mean loneliness scores (pre-test

mean loneliness score for the treatment group 31.95, s.d. ± 8.11; post-test mean loneliness score for the treatment group 31.17, s.d. ± 7.94; pre-test control group mean 31.76, s.d. ± 11.70; post-test control group mean 35.21, s.d. ± 10.35) was not demonstrated. The low mean loneliness score implies an overall satisfaction with the quality and quantity of social contacts and intimate relationships for the entire sample from the beginning of the program. This sample was not considered to be a socially isolated group based on the close proximity of peers, and the potential for social contact and integration within the congregate nature of the apartment complexes existed.

A one tailed t-test and paired sample t-test analysis was performed to determine significance and to support the hypothesis that less loneliness would be experienced by the treatment group. The following results were realized: paired sample t-test analysis for the treatment group between measurements ($p = .16$), control group between measurements ($p = .00$), and t-test analysis between post-test groups ($p = .00$). The t-test analysis for post-test scores demonstrated significance between groups but this consideration is supplanted by the fact that no significance was realized for the treatment group between measurement times. If the treatment group receiving the intervention did not significantly realize an improvement in loneliness between pre and post-intervention scores then the chances of significance being realized between groups based on t-test analysis is remote. Although limited insight is available as to reasons why the control group's post-test mean loneliness score increased from 31.76 to 35.21, it may be suggested that the intervention was successful in maintaining in a non-significant way a stable mean level of loneliness for the treatment group not realized by the control group over the time period allotted to the intervention.

Item analysis of the UCLA Loneliness Scale was performed for the treatment group before and after the intervention to determine where gains were realized by subjects within the instrument. Item analysis revealed significant gains in the following areas: 'I lack companionship', 'feeling alone', 'ability to find companionship' and 'feeling at one with others'. In that these items were significantly lower based on paired sample t-test analysis suggests that the intervention had some effect in improving the qualitative and quantitative dimensions of social contacts and intimate relationships not realized in the overall score. Although the dynamics involved in this process were not explored in a substantive sense, the items illustrated provide some insight into what may have unfolded during the intervention and may be understood in the following way. As seniors realized that they were not 'alone' by participating in the ALIVE program, i.e., that they had something in common with their peers, acquaintances were formed. As experiences were shared in the context of the program, 'the ability to find companionship' improved. With the realization that companionship was possible, an interpretation of the surroundings may have changed to reflect that social integration was possible with peers who were previously not known. Although the determinants involved in the reduction of loneliness and relationship building are numerous, aspects such as: the opportunity to confide in another, to share one's feelings and stories, to identify with someone going through the same experiences, to receive unconditional support and to offer someone empathy and compassion may have been operative among those who participated in the intervention group. Although item analysis of the instrument illustrates the areas where improvement was realized, it fails to define in a substantive sense the dynamics involved in the improvement of loneliness.

Weiss (1973) indicated that a person experiencing loneliness strives to eliminate or reduce the experience of loneliness. Based on Weiss' theoretical premise, those seeking to rid themselves of loneliness more likely would have participated in the intervention and would have scored higher on the instrument. It is realized, however, that those participating in the study, those who theoretically wanted to rid themselves of the loneliness experience, scored low on the loneliness scale. As scores for loneliness were low, there is no indication that participation in this intervention was to reduce or eliminate the experience of loneliness. Weiss' theory, therefore, does not hold for the participation realized in this study. His theoretical premise is questionable and speculation about reasons why loneliness scores were low may be understood best in terms of other factors which may have prevented participation in the study.

Although information is not available as to why the on-site program did not generate greater interest, speculation and discussion about the dynamics preventing participation follows. As such barriers as distance and cost were not issues preventing subjects from participating in the intervention, medical conditions limiting on-site participation may have been problematic. Also Koropeckyj-Cox (1998) indicated that loneliness may be a precursor to more serious depression which in turn interferes with social interaction. In depression one surrenders to the distress and does not seek social interaction to alter the experience. Peplau and Perlman (1982) indicated that loneliness is linked to higher risks of mental illness and suicide. Segrin (1994) indicated that there is a high comorbidity between depression and loneliness in the elderly. He stated "because advanced aging is often accompanied by decreased mobility, worsening health, and the death of peers, elderly persons are an especially susceptible population for experiencing

episodes of depression" (p. 304). As those who participated in the study had low mean depression scores with the mean for the entire sample being well below the midpoint on the GDS, it may be possible that a portion of the seniors experiencing higher levels of loneliness were depressed and therefore did not desire to participate in the study. West, Kellner and Moore-West (1986) confirm this thought by stating "In patients who are both lonely and depressed, the loneliness is positively correlated with negative feelings and negative judgment of personality attributes and negatively correlated with socialization" (p. 355).

Chapter Two identified loss and physical decline or deteriorating health as important determinants of loneliness and subsequent depression. Considering that 64.2% of the post-test sample was widowed, suggesting that substantial loss was experienced by the participants, the sample demonstrated the ability to adapt to loss as demonstrated by the low mean loneliness and depression scores. Cohler and Nakamura (1996) provided insight into the social redefinition and adjustment that can take place among seniors experiencing loss and physical decline:

> Aging is too often posed as a negative concept that implies loss and decline. Viewed from a life-course perspective, aging refers to the socially constructed and psychologically experienced passage of time.... It is precisely the social definition of the course of life that transforms the life span or cycle into the study of the life course. There is explicit recognition that changes with age are a function of the shared definitions of expectable life events (p. 154).

It is within the social context of the apartment complexes, the congregate nature of the environment, that a social re-definition of aging may have occurred and this may explain why seniors in this study adapted "to the losses of older years without the development of mental disorders" (Sullivan, 1997, p. 277) as demonstrated by the low mean depression score for the control group. Perhaps those who did not participate in the intervention were

unable to because of social commitments, engagements elsewhere and time contraints. Involvement in the program then does not suggest an attempt to rid oneself of the experience, but rather genuine interest and available time to participate in the program. This study challenges Weiss' theoretical premise especially if the expectation is that those experiencing loneliness will become involved in group activity to resolve the experience.

The relationships between loneliness and depression and loneliness and nutritional risk were positively and significantly related with a moderate relationship realized for loneliness and depression and a relatively weaker relationship realized between loneliness and nutritional risk. Loneliness and depression were moderately correlated ($r = .48$) indicating that 23% of the variance in loneliness is explained by depression and vice versa. This correlation corresponds with the literature which demonstrated a range from $r = .38$ to $r = .72$. Although this relationship is bidirectional, meaning that "depression can be both an initiating factor, and it can also be a consequence" (Killeen, 1998, p. 765) of loneliness, these are overlapping constructs which contribute to one another (West, Kellner & Moore-West, 1986). Korpeckyj-Cox (1998) indicated that loneliness may be a precursor to depressive illness and in turn a depressed affect may interfere with social interaction "further exacerbating both the objective and subjective dimensions of social isolation" (p. S304). As depression accounts for 23% of the variance in loneliness, other factors contributing to loneliness not necessarily realized in this study but cited in the literature include: old age, partner and household composition, health, situational restrictions, specific characteristics of the older adult family and socio-cultural constraints (Gierveld, 1998). In that this study

confirms prior correlational analyses, the importance of considering both loneliness and depression when one or the other is suspected needs to be considered for effective treatment because of the multi-factorial nature of these constructs and the fact that treatment of one may facilitate resolution of the other.

The relationship between loneliness and nutritional risk was significant and positive (r = .35). Although Gierveld (1998) indicated that loneliness results in a decrease in well-being in the form of depression, sleeping problems and disturbed appetite" (p. 77), few studies have attempted to correlate and confirm that the two variables are related. Although Walker and Beauchene (1991) demonstrated a negative and weak relationship between dietary adequacy and loneliness (r = - .28) their investigation of nutritional adequacy was different than the items of the NSI DETERMINE screen. Nutritional risk may also lead to loneliness. Paterson (1996) noted that problems associated with eating "adversely affect social and mental health and lead to considerable isolation and meal related anxiety" (p. 926). As food consumption and dining are often considered social events, conditions leading to nutritional risk are partly implicated in the experience of loneliness. Again, this relationship suggests that if loneliness is suspected nutritional risk screening may prevent unnecessary physiological decline among those at risk for poor outcomes.

The intervention did not significantly decrease depression for the treatment group. Depression was measured on the shortened version of the GDS which includes items measuring cognitions, self-image and losses. With mean scores being very close between groups on the GDS, and being well below the midpoint of the scale (7), depression did not seem to be a concern among the sample studied. Had significance been realized

between groups, the practical significance and clinical implications of this intervention on those realizing improvement to their depressed mood would have been minimal. Further investigation is usually not warranted unless scores are greater than or equal to 7 on the 15-item scale. Scores below this are not usually investigated unless there is reason to believe that an underlying depression exists. As the mean depression score for the control group was well below the midpoint for the scale, chances of underestimating an underlying depression for an entire sample are remote.

Sullivan (1997) identified risk factors that contribute to depression such as being female, divorced, separated or widowed and low socioeconomic status. Implicit in this consideration are the multiple, irreplaceable subsequent losses that may occur with the loss of a spouse which may lead to depression. Although the necessary risk factors were represented in the sample, low mean scores for the control group suggest that a depressed mood was not prevalent among the sample. Although scores on this instrument ranged from 0 to 14 with a low percentage (7.9%) of the sample being represented in the mid to high range, the majority of the sample was below the midpoint on the GDS. Although a low mean score of depression for the control group was not initially expected, the theoretical underpinning which suggests that those who are depressed surrender to their mood state and withdraw socially explains the low mean depression score for the control group. This is not to suggest that depressed people will not participate within groups of this nature, as 7.9% of the sample scored above the midpoint on the GDS, but rather that those who are depressed may be poorly represented in an intervention program where participation is based on choice. Although it was realized that a potential for depression existed based on the risk factors outlined by Sullivan, and thus a measure of depression

took place, it is not surprising that a low mean depression score was obtained for the control group.

Item analysis was performed to determine if significant gains were realized by the treatment group on various items not realized by the overall instrument. Analyzing each item demonstrated the intervention to be significant in the following areas: 'activities and interests dropped', 'life deemed as empty', 'feelings of helplessness' and 'problems with memory'. Although the interpretation of these items is overshadowed by the absence of significance realized between groups, insight is obtained as to where improvement was made and it may provide future direction for ongoing research. The ALIVE program provided this sample of seniors the opportunity to become involved in activities and interests that were inaccessible off-site. Through interaction with fellow peers, feelings of emptiness were significantly reduced. Feelings of helplessness, also significantly diminished for the treatment group, may have been reduced by regaining a level of function that facilitated the execution of activities of daily living. Memory was also improved by this intervention. This benefit is an important consideration as cognitive decline related to delirium, dementia and depression is highest among seniors and results in enormous health care costs (Sullivan, 1997). The benefit of improved memory by actively involving seniors in community programs may prevent seniors from being admitted prematurely into continuing care centers. More study in this area is required to confirm this finding.

The relationship between depression and nutritional risk was positively and significantly correlated at $r = .39$ which means that 15% of the variance in depression is accounted for by nutritional risk. This suggests that the variables are independent but not

mutually exclusive. As the relationship between these variables is realized in a non-directional way, one may be the cause of the other (Garetz, 1976): "Depression frequently causes anorexia and weight loss, while under-nutrition or deprivation of food can lead to a syndrome of depression" (p. 73). Ham (1994) indicated that the sequelae of loss of self-worth, indecisiveness and other cognitive loss will exacerbate poor nutritional status. As depression is cited as the most common cause of weight loss and subsequent nutritional risk in community-dwelling seniors (Marcus & Berry, 1998), early "diagnosis of depression is crucial in order to initiate adequate antidepressant therapy and nutritional support" (p. 164). Wallace and Schwartz (1997) indicated that treatment of depression "often leads to rapid improvements in appetite and intake" (p. 727). Therefore, a consideration of one without the other may place the person at further risk and "can combine to produce a self-sustaining downward spiral in an elderly person's clinical state" (Garetz, 1976, p. 73).

Nutritional risk was measured using the NSI DETERMINE checklist developed as part of the Nutrition Screening Initiative. This 10-item, yes/no instrument broadly screens for personal and environmental conditions that contribute to poor nutritional intake leading to nutritional risk and was a collaborative effort of the American Academy of Family Physicians, the American Dietetic Association and the National Council on the Aging. The ten warning signs of poor nutritional status identified in this screen are: disease, eating poorly, tooth loss or pain, economic hardship, reduced social contact, multiple medications, involuntary weight loss and needing assistance in self care. The significant reduction in nutritional risk between groups may suggest that a person's nutritional intake can improve despite being in a low-income situation. Although Posner,

Smigelski and Krachenfels (1987) found that income did not predict nutrient intake in a group of homebound elderly, and nutritional intake cannot be extrapolated from the NSI DETERMINE checklist, the significant decrease in risk for the treatment group suggests in part a shift in nutrient intake which was realized in the significant change to item three of the screen.

Although the intervention included nutrition counseling, the impact of these sessions on significantly decreasing nutritional risk is unclear. As the program was broad based to address the health concerns of this age group, it cannot be stated with certainty whether the counseling or some other aspect of the program resulted in the decreased risk in nutritional intake. As there are no baseline measures of this parameter, there is no easy way of determining whether the treatment group's risk before and after treatment was significantly decreased. Caution in the interpretation of the post t-test analysis of significance between groups for this variable is warranted based on findings realized for the loneliness variable. Although significance was realized between groups for post-test loneliness scores a false conclusion of significance would have been forwarded in the absence of pre-treatment scores. In that it is uncertain as to what exactly decreased nutritional risk scores between groups, it may be suggested that some aspect of the intervention resulted in this change without giving credence to any one tenant of the intervention. As the screen includes various nutritional risk factors, item analysis was performed to determine which items were significantly influenced by the intervention.

Significant improvement was realized in three areas: 'consumption of fruit, vegetable and milk products' which indicates a shift in food items consumed, 'insufficient money to buy food needed' and 'inability to always shop, cook and/or feed

myself'. Although the consumption of fruit, vegetables and milk products does not provide much information about the diet consumed before and after the intervention, significance realized in this item suggests that a change occurred in dietary intake toward healthful food choices. Although particular diets were not recorded before, during or on completion of the intervention, a change in dietary intake resulting in decreased nutritional risk for the treatment group may suggest that despite low income nutritional risk can be improved. This supports the conclusion made by Posner, Smigelski and Krachenfels (1987) that income does not predict nutrient intake and suggests that improvements to intake may be realized with programs that incorporate an exercise and education component in the achievement of well-being.

The significant result attributed to 'insufficient money to buy food needed' is important considering that income remained stable between groups throughout the period of the study. As it is unlikely that income status changed for the treatment group, as both groups were in a low-income situation, the significant change realized in 'consumption of fruit, vegetable and milk products' and 'insufficient money to buy food needed', suggests that money previously not available to buy food may be sufficient if spent on healthful food items. Markson (1997) supported this notion by saying "poor elderly are less likely to spend money on food, and they are likewise more likely to shop at expensive convenience and neighborhood groceries rather than cheaper supermarkets" (p. 649). As many food items are expensive in convenience type stores, limited funds may be quickly expended. Although no indication as to shopping habits can be deduced from this study, an intervention which results in sufficient funds being available for nutritional food

intake is of clinical importance in reducing the morbidity and mortality associated with poor nutritional status.

Barrocas, Belcher, Champagne and Jastram (1995) acknowledged that exercise is an integral part of an overall healthy nutritional state. The 'inability to always shop, cook and/or feed' oneself is specific to performing an important activity of daily living. An improvement in this area means an improvement in function and the resolution of a self-care deficit. Quinn (1997) indicated that physical frailty or disability may "make it impossible for persons to shop or cook for themselves and ultimately may prevent them from feeding themselves" (p. 19). Physical frailty and disability can therefore create a downward spiral of poor health outcomes resulting in further physiological decline and eventual death. As this sample of senior women lived in private suites with the expectation that they be responsible for their own meal preparation, difficulties in acquiring food, preparing and consuming it is an important area for intervention to prevent premature placement to other care facilities. Although a consideration of factors that made this item significant may be variable, the exercise component which was aimed at maintaining or restoring function and the education component which provided information on healthful food choices and alternative arrangements for obtaining food items enabled those with functional decline to better manage their own lives. Markson (1997) stated "the outcome of functional disability in any domain is reduced patient quality of life in the spheres of psychological well-being, physical health and social contacts" (p. 641). As a level of function was restored, it is not unlikely that seniors in the treatment group started preparing and sharing meals with other peers which may have resulted in a perceived improvement to their quality of life. Although it cannot be

specified as to which aspect of the ALIVE intervention had the effect of significantly reducing the treatment group's risk for poor nutritional intake as measured on the NSI DETERMINE checklist, exercise and nutritional counseling, providing the opportunity to participate in health and wellness activities with an education component, may have resulted in improved nutritional outcomes for those participating in the intervention.

No significant relationship was realized between percent change BMI scores and nutritional risk scores ($r = .10$, $p = .21$). This finding was confirmed by Phillips and Read (1997). Although it was previously indicated that low body weight and unintentional weight loss of greater than 5% of baseline or 10 pounds over a period of 6 to 12 months is highly predictive of morbidity and mortality (Fischer and Johnson, 1990), BMI measures are at best a crude marker of nutritional adequacy and malnutrition (Phillips & Read, 1997) and it does not provide insight into the broad spectrum of possible risk factors that contribute to nutritional risk. The BMI measure merely provides a direction for further assessment. A single item screen is inadequate to determine the multiple risk factors involved in nutritional risk, and does not compare concurrently with a multifaceted measure which screens for various risk factors that contribute to nutritional risk. The validity of the NSI DETERMINE checklist for detecting nutritional risk based on this insignificant and weak correlation therefore does not suggest that the NSI screen is invalid but is unsubstantiated by this study. As no other instruments were used to screen for nutritional risk in this study, further comparison was not possible. Further analysis with measures that are multifaceted and equivalent in construct may eventually result in the validation of this screen.

The weak correlation between these two measures may be related to the fact that both measure different phenomena. Body mass index is an indicator of body fat in relation to lean body mass (Quinn, 1997) a score which is validated by measuring body fat with calipers (Reuben, Greendale & Harrison, 1995). Body mass index scores may not be a valid indicator of nutritional risk in this population because subcutaneous tissue thins in the aged making it difficult to measure body fat with the use of calipers. Body mass index scores were also established in a cohort whose age was less than 65 with the results generalized to this heterogenous population. Although it is accepted that a BMI score below 24 reflects underweight and a score greater than 27 reflects overweight (Quinn, 1997), this standard may not apply to an older population especially when considering the multiple medical problems experienced by this population.

The mean BMI score for the entire sample was 28.58, which suggests that the sample was overweight based on current BMI standards. Cross sectional analysis for this study revealed that the majority of the sample 53.6% were above 27 and were overweight, 24.5% were below 24 and were underweight and the remaining 21.9% were within the recommended BMI standard. Being overweight may contribute to mobility problems and a constellation of other deficits but it may also be protective by being a physiological reserve of much needed energy during times of illness. As weight loss predicts morbidity, and the potential for further weight loss occurs with illness, being overweight may be considered less of a concern than being underweight in the senior population. Body mass index cut-off points may need to be redefined so that those whose weight is borderline, i.e., at the lower end of the acceptable BMI range, are not compromised by weight loss associated with eventual illness. The percent change BMI

mean score for the treatment group was -.16% indicating minimal weight loss and .76 for the control group reflective of minimal weight gain during the 8 month duration of the ALIVE program. Thus the percent change BMI mean score between groups virtually remained unchanged during the time period of the intervention. It may be suggested that rather than focusing on achieving a desirable BMI score for those who present as overweight in an at-risk group, maintaining stability in weight may be more beneficial than focusing on weight loss. Unless being over-weight results in deleterious health outcomes, weight loss may be undesirable if it places a person at physiological risk. Of concern then would be those experiencing adverse health consequences such as diabetes, high blood pressure and joint pain related to obesity, and particularly those who are experiencing illness with progressive deterioration related to being nutritionally compromised and underweight.

The weak correlation between these two variables may also have been realized because weight loss as reflected in percent change BMI scores is incorporated as one of the items within the multi-item nutritional screen. As this is one variable among many in the assessment of nutritional risk, and mean weight loss of greater than 5% or 10 pounds was not realized over the eight month period of the study, a relationship could not be established. This suggests that weight loss alone may not adequately assess nutritional risk in this population. If weight loss is a sensitive indicator of poor nutritional status as the literature reports, this study illustrates the need to consider other factors when screening for poor nutritional intake.

A systematic discussion of the statistical findings was presented in this chapter. It is realized that although a significant decrease in nutritional risk was realized for the

treatment group assertions of significance are not entirely supported because of the lack of baseline scores. Consequently further research is required to determine whether a program of this nature would be effective in reducing nutritional risk among those at risk for poor health outcomes. Research is imperative so that programs are specific to decreasing the morbidity and mortality associated with poor nutritional intake among those who are at risk for poor outcomes related to their socioeconomic conditions. As poor nutritional status has deleterious health outcomes, programs developed to proactively address nutritional risk in at-risk groups are needed. A valid screen that addresses this concern reliably and with high sensitivity and specificity may reduce the incidence of suffering related to deficient nutrition.

CHAPTER 6

Conclusions and Recommendations

In conclusion, this study incorporating a cross-sectional analysis with an experimental group design, demonstrated that the ALIVE program may have had some significant effect on decreasing nutritional risk among low-income seniors. The program did not demonstrate significance for improving mean scores of loneliness and depression between groups. Correlation analysis demonstrated a significant, positive but weak relationship between loneliness and nutritional risk, and depression and nutritional risk and a moderate relationship between loneliness and depression. No significant relationship was realized between percent change BMI scores and the NSI DETERMINE checklist meaning that a validity score was unobtainable. Reliability analysis using the KR-20 formula revealed a reliability coefficient of .72 reflecting a reasonable level of reliability.

Caution is recommended when making inferences of causality. As baseline data was not available to determine whether a change in nutritional risk occurred for the treatment group before and after the ALIVE program, a causal relationship between the ALIVE program and reduced nutritional risk may not be supported despite the significant decrease realized between groups based on post t-test analysis. This caution is warranted based on the analysis of the loneliness variable. Had baseline data not been gathered on this variable, conclusions based on the post t-test analysis alone would have resulted in an erroneous conclusion of significance between groups. The paired sample t-test demonstrated that significance could not be supported, and from this effect caution is

recommended in asserting that the intervention caused a significant reduction in nutritional risk for the treatment group.

As the NSI DETERMINE checklist has not been validated in this study or in others, there is no certainty that the screen is adequately measuring nutritional risk. Until this screen is validated inferences of causality will be suspect to further inquiry. This research is also in agreement with other studies which recommend the development of a nutritional screen that has high sensitivity and specificity (Reuben, Greendale & Harrison, 1995; MacLellan & Val Til, 1998). As a result, this screen may under or over-estimate nutritional risk among seniors. The ideal nutrition screen has not been developed or validated (Posner, Jette, Smith & Miller, 1993) and continuing research in this area is a priority to reduce morbidity and mortality related to poor nutritional status. Although this study focused on nutritional risk related to weight loss, it is realized that nutritional risk and malnutrition refer to both under and over-nutrition. Although the sequelae of physiological events related to being underweight may be predictable, morbidity and mortality related to obesity in this cohort is not well understood and relatively few studies have investigated this relationship. An improvement in dietary outcomes for those nutritionally at risk related to being over-nourished may result in reduced pain related to arthritis, improvements in functional ability related to impaired ambulation and/or improved overall physiological well-being.

Body mass index measurements may be invalid in the determination of over and under-nourishment in this age group as this measure does not take into consideration the multiple dynamics associated with aging. It is therefore recommended that caution be taken when programs focus on weight reduction in this age cohort. As weight loss is

related to morbidity and mortality, maintaining stability in weight may be the desired goal. To preserve physiological health, the cut-off points may need to be re-examined so that those at the low end of the BMI standard (24) are not compromised from illness and physiological decline in advanced age.

This study is one of few that demonstrate a relationship between loneliness and nutritional risk and depression and nutritional risk. Thus, an improvement in any one variable may result in an improvement in the other variables studied. Further research needs to be conducted to determine the effectiveness of programs on loneliness, depression and nutritional status in other settings, to extend this research to other at-risk senior groups and to confirm and establish confidence in the findings obtained in this study. Improvement to loneliness, depression and nutritional risk through screening initiatives may mean improvements to overall quality of life for seniors at risk for poor outcomes. Important gains may be realized if quality of life variables are measured by community nurses and appropriate referrals are made within the community. As the screens used in this study can be administered within a short period of time, vital information may be obtained to direct future care.

The external validity of this study is limited to low-income senior women living in Edmonton in apartment complexes subsidized by the Greater Edmonton Foundation experiencing the ALIVE program. The results cannot be generalized beyond the scope of this study which is age, gender, income, location and program specific. Internal validity may also have been threatened. As the strength-training component of the intervention was tailored to the level of function demonstrated by the participants, those with greater function may have demonstrated more gains than those with greater debility and in effect

treated favorably by those facilitating the program. Preferential treatment may have been shown to those who demonstrated interest in the program, were socially approachable and voiced improvement in their quality of life related to the program. As several undergraduate students and registered nurses were hired to administer the program and collect the results, internal validity may have also been threatened by a lack of inter-rater reliability. As the program was tailored to the needs of seniors, the intervention may not have been administered consistently for every participant in the treatment group. As threats to internal validity may jeopardize experimental control and confidence that the independent variable resulted in the significant result realized, further research is recommended to eliminate these threats. With ongoing research to improve quality of life outcomes for seniors, the implementation and application of programs to improve outcomes for at-risk senior groups will be supported by studies that have been proven effective through the control and rigor of experimental design.

As the mean loneliness and depression scores were well below the midpoint for the treatment group, any further improvement or reduction in loneliness and depression would raise the issue of clinical meaningfulness and significance of the results. Although statistical significance was not realized between groups on the loneliness and depression measures but realized on items within the measures, it is not known whether a clinically significant gain was realized based on those items that demonstrated statistical significance. The feasibility and practicality of implementing programs to resolve low levels of loneliness or depression may override statistical significance if gains are minimal, and despite statistical significance an intervention may not be warranted when mean scores are below a certain score. Future research should guide this inquiry and is

recommended so that the expenditure of scarce resources supports both clinical and statistical gains.

Although it was realized that those who exhibit depression may not join a study of this nature, an intervention or program designed to stimulate interest among those who are and are not depressed would target a larger portion of the senior population. Peer support is not lacking in apartment complexes and a program that encourages seniors to provide support to depressed and withdrawn seniors would place the onus of responsibility on those who share something in common as a group as opposed to relying exclusively on the health care system for resolution of this mood disorder.

The NSI was reliable at .72 demonstrating homogeneity or internal consistency. It was assumed that the items were of equal difficulty. To achieve equal weight the mean of all the items on the screen was calculated and then divided into the mean and variance obtained. The reliability coefficient r = .72 indicates that the scale has a reasonable level of internal consistency reliability.

Summary

One hundred and fifty one subjects participated in the ALIVE program which consisted of an exercise strengthening program, health education and monthly bulletins. Senior women, aged 60 years and older, living in a low-income situation in subsidized apartment buildings participated in the ALIVE program and were randomly assigned to a treatment and control group. Those participating in the treatment group experienced a reduction in nutritional risk. A positive and significant relationship was realized between loneliness and depression, loneliness and nutritional risk and depression and nutritional risk. The nutritional screen was not validated by percent change BMI scores and no other

construct was used in this study to establish validity. The reliability coefficient was established at .72 which is reasonable. Further research is recommended in the area of interventions that would improve quality of life among seniors. The ALIVE intervention was not successful in improving scores of loneliness and depression, but may have contributed to the significant reduction in nutritional risk between groups. This significant change is regarded as important and further investigation in the prevention of nutritional risk is essential to prevent unnecessary morbidity and mortality among an age group that is demonstrating vitality in old age.

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Appendix 1

Nutritional Health Checklist

DETERMINE YOUR NUTRITIONAL HEALTH

The warning signs of poor nutritional health are often overlooked. Use this checklist to find out if you are at risk. Read the statements below.
Circle the number in the Yes column for those that apply to you.
For each Yes answer, score the number in the box.
Total your nutritional score.

	YES
1. I have an illness or condition that made me change the kind and/or amount of food I eat.	2
2. I eat fewer than two meals per day.	3
3. I eat few fruits, vegetables, or milk products.	2
4. I have three or more drinks of beer, liquor, or wine almost every day.	2
5. I have tooth or mouth problems that make it hard for me to eat.	2
6. I don't always have enough money to buy the food I need.	4
7. I eat alone most of the time.	1
8. I take three or more different prescribed or over-the-counter drugs a day.	1
9. Without wanting to, I have lost 10 pounds in the last eight months.	2
10. I am not always physically able to shop, cook, and/or feed myself.	2
Total	/21

0 – 2	Good!
3 – 5	You are at moderate nutritional risk. Follow-up is required.
6 or greater	You are at high nutritional risk.

The warning signs suggest risk but do not represent a diagnosis of any condition. See the 'DETERMINE' risk factors in Appendix 2 to learn more about the warning signs of poor nutritional health.

Appendix 2

The mnemonic DETERMINE specifies the warning signs of nutritional risk.

D: Disease
Any disease, illness or chronic condition that causes you to change the way you eat, or makes it hard for you to eat, puts your nutritional health at risk. Four out of five adults have chronic diseases that are affected by diet. Confusion or memory loss that keeps getting worse is estimated to affect one out of five or more older adults.

E: Eating Poorly
Eating too little and eating too much both lead to poor health. Eating the same foods day after day or not eating fruit, vegetables and milk products daily will also cause poor nutritional health. One in five adults skip meals daily. Only 13% of adults eat the minimum amount of fruit and vegetables needed. One in four older adults drink too much alcohol.

T: Tooth Loss/Mouth Pain
A healthy mouth, teeth and gums are needed to eat. Missing, loose or rotten teeth or dentures which don't fit well or cause mouth sores make it hard to eat.

E: Economic Hardship
As many as 40% of older Americans live in a low-income situation making it difficult to get foods required to stay healthy.

R: Reduced Social Contact
One-third of all older people live alone. Being with people daily has a positive effect on morale, well-being and eating.

M: Multiple Medicines
Manly older people must take medicines for health problems. Growing old may change the way we respond to medication. The more medicines you take, the greater the chance for side effects such as increased or decreased appetite, change in taste, constipation, weakness, drowsiness, diarrhea and nausea.

I: Involuntary Weight Loss/Gain
Losing or gaining a lot of weight when you are not trying to is an important warning sign that must not be ignored. Being overweight or underweight also increases your chance of poor health.

N: Needs Assistance in Self-Care
Although most older people are able to eat, one of every five has trouble walking, shopping, buying and cooking food especially as they get older.

E: Elderly Years above Age 80
Most older people lead full and productive lives. But as age increases, the risk of frailty and health problems increases. Checking your nutritional health regularly makes good sense.

The Nutrition Screening Initiative materials were developed by the Nutrition Screening Initiative, 2626 Pennsylvania Ave. NW, Suite 301, Washington DC 20037. It is a project of the American Academy of Family Physicians, American Diabetic Association, and the National Council on the Aging, Inc.

Appendix 3

Geriatric Depression Scale

Choose the best answer for how you felt over the past week.	Yes	No
1. Are you basically satisfied with your life?	0	1
2. Have you dropped many of your activities and interests?	1	0
3. Do you feel that your life is empty?	1	0
4. Do you often get bored?	1	0
5. Are you in good spirits most of the time?	0	1
6. Are you afraid that something bad is going to happen to you?	1	0
7. Do you feel happy most of the time?	0	1
8. Do you often feel helpless?	1	0
9. Do you prefer to stay at home at night, rather than go out and do new things?	1	0
10. Do you feel you have more problems with memory than most?	1	0
11. Do you think it is wonderful to be alive now?	0	1
12. Do you feel pretty worthless the way you are now?	1	0
13. Do you feel full of energy?	0	1
14. Do you feel that your situation is hopeless?	1	0
15. Do you think that most people are better off than you are?	1	0

Date:
Subjects Name:
Comments:

Total: /15

Sheikh & Yesavage 1986

(Score > 7 may suggest depression)

Appendix 4

Revised UCLA Loneliness Scale

Please read each of the statements below and circle the answer that best describes how you are feeling.

1. I feel in tune with the people around me.

Never	Rarely	Sometimes	Often
1	2	3	4

2. I lack companionship.

Never	Rarely	Sometimes	Often
1	2	3	4

3. There is no one I can turn to.

Never	Rarely	Sometimes	Often
1	2	3	4

4. I do not feel alone.

Never	Rarely	Sometimes	Often
1	2	3	4

5. I feel part of a group of friends.

Never	Rarely	Sometimes	Often
1	2	3	4

6. I have a lot in common with the people around me.

Never	Rarely	Sometimes	Often
1	2	3	4

7. I am no longer close to anyone.

Never	Rarely	Sometimes	Often
1	2	3	4

8. My interests and ideas are not shared by those around me.

Never	Rarely	Sometimes	Often
1	2	3	4

9. I am an outgoing person.

Never	Rarely	Sometimes	Often
1	2	3	4

10. There are people I feel close to.

Never	Rarely	Sometimes	Often
1	2	3	4

11. I feel left out.

Never	Rarely	Sometimes	Often
1	2	3	4

12. My social relationships are superficial.

Never	Rarely	Sometimes	Often
1	2	3	4

13. No one really know me very well.

Never	Rarely	Sometimes	Often
1	2	3	4

14. I feel isolated from others.

Never	Rarely	Sometimes	Often
1	2	3	4

15. I can find companionship when I really want to.

Never	Rarely	Sometimes	Often
1	2	3	4

16. There are people who really understand me.

Never	Rarely	Sometimes	Often
1	2	3	4

17. I am unhappy being so withdrawn.

Never	Rarely	Sometimes	Often
1	2	3	4

18. People are around me but not with me.

Never	Rarely	Sometimes	Often
1	2	3	4

19. There are people I can talk to.

Never	Rarely	Sometimes	Often
1	2	3	4

20. There are people I can turn to.

Never	Rarely	Sometimes	Often
1	2	3	4

Appendix 5

Kuder-Richardson formula 20

$$r_{xx} = \frac{n}{n-1}\left[1 - \frac{\bar{x}(n-\bar{x})}{ns_x^2}\right]$$

Where $\bar{x}$ = mean test score
s_x^2 = variance

mean weight of each item = 2.1

mean = 3.11/2.1 = 1.4809

variance = 7.51/2.1 = 3.5762

Calculation:

$$r_{xx} = \frac{10}{9}\left[1 - \frac{1.4809(10-1.4809)}{10X3.5762}\right]$$

r_{xx} = .719139 or .72